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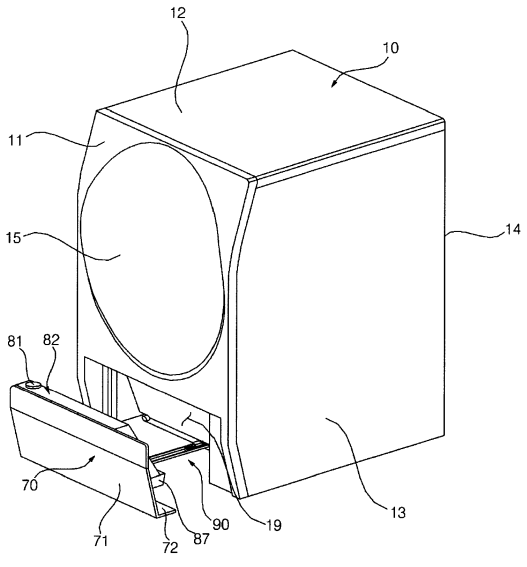
(54) DRYER

(57) Disclosed herein is a dryer. In the dryer according to an embodiment of the present invention, the length in which a condensate discharge container (82) for storing a condensate is pulled out can be minimized because a length in the front and back direction of the condensate discharge container (82) is smaller than a length in the width direction of the condensate discharge container (82). Stability is increased because the condensate discharge container (82) is disposed under a cabinet (10). The dryer according to an embodiment of the present invention has advantages in that a space required to pull out the condensate discharge container (82) can be minimized because the condensate discharge container (82) is laterally disposed and a drum (30) having a higher capacity compared to the same size can be installed because a structure disposed over the drum (30) within the cabinet (10) is minimized.

Fig. 2



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Description

[0001] The present invention relates to a condensation type dryer.

[0002] In general, a laundry processing apparatus is an apparatus for processing the laundry by applying physical and chemical actions to the laundry, and collectively refers to a washer for removing contaminants on the laundry, a dehydrator for dehydrating the laundry by rotating a washing tub containing the laundry at high speed, and a dryer for drying wet laundry by applying cold air or hot air to a washing tub.

[0003] A laundry processing apparatus capable of drying clothing may be classified as an exhaust type drying system and a circulation type (or a condensation type) drying system based on the flowing method of air in supplying air (i.e., hot air) of a high temperature to clothing.

[0004] The circulation type drying system is configured to dehumidify moisture from air discharged by a tub, heat the air again, and supply the heated air to the inside of the tub again.

[0005] The exhaust type drying system is configured to supply heated air to the inside of the tub, but to discharge air discharged by the tub to the outside of a laundry processing apparatus without supplying the discharged air to the inside of the tub.

[0006] In a conventional condensation type drying system, a condensate discharge container for storing a condensate is inserted in the front and back direction of a cabinet. Furthermore, the conventional condensate discharge container is disposed over a drum so that a user can lift up the condensate discharge container easily.

[0007] However, there is a problem in that the space corresponding to the length of the condensate discharge container must be secured at the front of the washing machine due to the structure of the condensate discharge container that is disposed back and forth.

[0008] Furthermore, there are problems in that the center of gravity of the drying system rises and the drying system becomes vulnerable to vibration when the condensate discharge container is filled with a condensate because the condensate discharge container is disposed over the drum.

[0009] In general, the dryer is stacked on the upper side of the drum washing machine.

[0010] If the dryer is stacked on the upper side of the drum washing machine as described above, there are problems in that the condensate discharge container placed over the drum is placed above the breast of a user, which makes it difficult to draw the condensate discharge container out.

[Prior Art Document]

[0011] [Patent Document] Korean Patent No. 10-0373483

Summary of the Invention

[0012] An object of the present invention is to provide a dryer capable of minimizing a space required to draw a condensate discharge container out.

[0013] Another object of the present invention is to provide a dryer, which is capable of increasing the utilization of the space within a cabinet and increasing the capacity of a drum.

[0014] Yet another object of the present invention is to provide a dryer capable of further lowering the center of gravity when a condensate is stored.

[0015] Further yet another object of the present invention is to provide a dryer which enables a user to draw the condensate discharge container out easily.

[0016] Further yet another object of the present invention is to provide a dryer capable of uniformly distributing a load to the entire dryer.

[0017] Still yet another object of the present invention is to provide a dryer, which is capable of minimizing a space attributable to the drawing of the condensate discharge container and reducing vibration because the center of gravity is lowered through a generated condensate.

[0018] Still yet another object of the present invention is to provide a dryer capable of drawing the condensate discharge container out easily although the dryer is stacked over the drum washing machine.

[0019] These objects are achieved with the features of the claims. Technical objects to be achieved by the present invention are not limited to the aforementioned objects, and those skilled in the art may evidently understand other technical objects from the following description.

[0020] In a dryer according to an embodiment of the present invention, the length in which a condensate discharge container for storing a condensate is pulled out can be minimized because a length in the front and back direction of the condensate discharge container is smaller than a length in the width direction of the condensate discharge container. Stability is increased because the condensate discharge container is disposed under a cabinet.

[0021] In the dryer according to an embodiment of the present invention, a condensation storage unit, a bucket, and a drawer are together pulled out forward from the cabinet.

[0022] A dryer according to an embodiment of the present invention includes a cabinet configured to have an entry hole formed on the front surface of the cabinet, a door being installed in the entry hole, a drum disposed within the cabinet and configured to rotate with the laundry received within the drum, an evaporator disposed within the cabinet and configured to remove moisture from air circulating through the drum by condensing the moisture, a condensate housing disposed within the cabinet, a condensate condensed by the evaporator being collected at the condensate housing, a drawer space dis-

posed under the entry hole and depressed backward from the front surface of the cabinet, a drawer disposed in the drawer space and configured to move with respect to the cabinet in such a way as to be pulled out from the drawer space, and a condensate discharge container configured to have the condensate of the condensate housing moved and stored in the condensate discharge container, detachably held in the drawer, and exposed to a user when the drawer is pulled out.

[0023] The condensate discharge container may be configured to be pulled out forward from the cabinet.

[0024] The drawer may be installed to linearly move back and forth with respect to the cabinet.

[0025] The drawer space may be placed under the entry hole.

[0026] The drawer space may be placed inside the front surface of the cabinet.

[0027] The drawer may be placed under at least one of the drum and the door.

[0028] The condensate discharge container may be disposed in the width direction of the cabinet.

[0029] The condensate discharge container may have a length longer in a left and right width direction than in a front and back direction.

[0030] A front and back direction length w1 on the top surface of the condensate discharge container may be smaller than a front and back direction length w2 on the bottom surface of the condensate discharge container.

[0031] The condensate housing may be disposed at the back of the condensate discharge container.

[0032] An incline plane may be formed on the back surface of the condensate discharge container. The front surface of the condensate housing may be inclined in accordance with the incline plane of the condensate discharge container.

[0033] The drawer may be configured to cover at least part of the condensate discharge container.

[0034] The drawer may include a bucket for storing a condensate overflowed from the condensate discharge container.

[0035] The dryer may further include an overflow path disposed between the bucket and the condensate housing and configured to recover the condensate overflowed from the condensate discharge container toward the condensate housing. The overflow path may be disposed on at least one of the bucket side and the condensate housing side. The coupling of the bucket and the condensate housing by the overflow path may be released when the drawer is pulled out from the drawer space. The bucket and the condensate housing may be coupled by the overflow path when the drawer is received in the drawer space.

[0036] The drawer may include a drawer cover configured to cover at least part of the condensate discharge container and the bucket disposed on the back surface of the drawer cover and configured to have the condensate discharge container held in the bucket.

[0037] The dryer may further include a guide supporter configured to guide the pulling out of the drawer by coupling the bucket and the cabinet and to support a load of the drawer and the condensate discharge container.

[0038] The dryer may further include a guide supporter configured to guide the pulling out of the drawer by coupling the bucket and the condensate housing and to support a load of the drawer and the condensate discharge container.

[0039] The drawer may further include a drawer holder disposed in the drawer cover, coupled to the cabinet, and configured to support a load of the condensate discharge container. The dryer may further include a guide supporter configured to guide the pulling out of the drawer by coupling the drawer holder and the cabinet and to support a load of the drawer and the condensate discharge container.

[0040] The drawer may include a drawer holder disposed in the drawer cover, coupled to the cabinet, and configured to support a load of the condensate discharge container. The dryer may further include a guide supporter configured to guide the pulling out of the drawer by coupling the drawer holder and the condensate housing and to support a load of the drawer and the condensate discharge container.

[0041] An incline plane may be formed on the back surface of the condensate discharge container.

Brief Description of the Drawings

[0042]

FIG. 1 is a perspective view of a dryer according to a first embodiment of the present invention.

FIG. 2 is a perspective view showing the state in which a drawer assembly of FIG. 1 has been pulled out.

FIG. 3 is a perspective view showing the inside of the dryer of FIG. 1.

FIG. 4 is a perspective view showing the lower side under a drum of FIG. 3.

FIG. 5 is a plan view showing the lower side under the drum of FIG. 3.

FIG. 6 is an exploded perspective view of the drawer assembly of FIG. 2.

FIG. 7 is a perspective view of a guide supporter shown in FIG. 2.

FIG. 8 is a cross-sectional view showing the state in which a condensate discharge container of FIG. 1 has been received.

FIG. 9 is an exploded perspective view showing the back side of the drawer assembly of FIG. 6.

FIG. 10 is a perspective view showing the state before the drawer assembly of FIG. 1 is pulled out.

FIG. 11 is a perspective view showing the state after the drawer assembly of FIG. 1 is pulled out.

Detailed Description of the Embodiments

[0043] The merits and characteristics of the present invention and methods for achieving the merits and characteristics will become evident with reference to embodiments described in detail later in conjunction with the accompanying drawings. However, the present invention is not limited to the disclosed embodiments, but may be implemented in various other ways. The embodiments are merely provided to complete the disclosure of the present invention and to allow a person having ordinary skill in the art to which the present invention pertains to completely understand the category of the invention. The present invention is defined by the category of the claims only. In the specification, the same reference numerals designate the same elements.

[0044] A dryer according to the present embodiment is described with reference to FIGS. 1 to 11.

[0045] The dryer according to the present embodiment includes a cabinet 10 configured to form an external appearance, a drawer space 19 depressed backward from the front surface of the cabinet 10, a drum 30 disposed within the cabinet 10 and configured to have the laundry received therein and rotated, a driving unit 40 configured to rotate the drum 30, a heat pump unit 50 configured to dry the laundry by heating air circulating in the drum 30 and to remove moisture from the circulating air by condensing the moisture, an air circulation unit 60 configured to circulate the air of the drum 30, a condensate storage module 80 disposed in the cabinet 10 and configured to include a condensate discharge container 82 in which a condensate condensed by the heat pump unit 50 is moved and stored, and a drawer 70 disposed in the drawer space 19 and pulled out forward from the cabinet 10, thus exposing the condensate discharge container 82 to a user.

[0046] In the present embodiment, the drawer 70 and the condensate discharge container 82 are together pulled out forward from the cabinet 10.

[0047] The condensate discharge container 82 is hidden in the drawer space 19 and is exposed out of the cabinet 10 when the drawer 70 is pulled out.

[0048] The condensate discharge container 82 maintains the state in which it is hidden in the drawer space 19 until the drawer 70 is pulled out. The drawer 70 is coupled to a guide supporter 90 and is pulled out forward from the cabinet 10 along the guide supporter 90.

[0049] The condensate discharge container 82 and the drawer 70 are collectively defined as a drawer assembly.

[0050] The drawer space 19 in which the drawer assembly is received is formed in the cabinet 10. The drawer space 19 may be formed on the outside of the cabinet 10. The drawer space 19 may be disposed under the drum 30. The drawer space 19 may be disposed under an entry hole 17 through which the laundry is inputted.

[0051] The cabinet 10 forms an external appearance of the dryer. The cabinet 10 has a door 15 disposed at its front. The door 15 is turned left and right and opens/shuts the inside of the cabinet 10.

[0052] The cabinet 10 includes a front cover 11, a top plate 12, side covers 13, a rear cover 14, and a base 16. The door 15 is disposed in the front cover 11.

[0053] The entry hole 17 through which the laundry is inputted is formed in the front cover 11.

[0054] The drawer space 19 is placed on the lower side of the front cover 11. The drawer space 19 is depressed backward from the front cover 11.

[0055] When the drawer 70 is received in the drawer space 19, it forms a face consecutive to the front cover 11.

[0056] Unlike in the present embodiment, the drawer space 19 may be placed inside the front cover 11. That is, the drawer space 19 may be disposed in such a way as to be surrounded by the front cover 11.

[0057] The cabinet 10 may generally have a rectangular parallelepiped shape.

[0058] The door 15 is disposed on the front surface of the cabinet 10 and operates so that it turns left and right.

[0059] The entry hole 17 opened/shut by the door 15 communicates with the drum 30.

[0060] The drum 30 is disposed within the cabinet 10. In order to maximize the capacity of the drum 30, the condensate storage module 80 is disposed under the drum 30.

[0061] Accordingly, the diameter of the drum 30 within the cabinet 10 can be maximized because other parts for an operation are not disposed over the drum 30.

[0062] The drum 30 is formed in a cylindrical shape. The drum 30 has a lifter 31 disposed therein. The lifter 31 lifts up the laundry within the drum while rotating and then lets the laundry to freely fall.

[0063] The driving unit 40 includes a driving motor 42 fixed to the cabinet 10. The driving shaft 41 of the driving motor 42 is coupled to the back of the drum 30. The drum 30 may be rotated forward or backward by the rotation of the driving motor 42.

[0064] A circulation flow path along which air within the drum circulates is formed in the drum 30.

[0065] In the present embodiment, air has been illustrated as flowing from the back of the drum 30 to the inside of the drum, and air has been illustrated as being discharged to the front of the drum. In some embodiments, the circulation flow path along which air within the drum circulates may be formed in various ways.

[0066] The air circulation unit 60 includes an impeller 61, an air circulation motor 62 configured to rotate the impeller 61, and the circulation flow path along which air flown by the impeller 61 is guided.

[0067] In the present embodiment, the impeller 61 is disposed inside the rear cover 14. More specifically, the impeller 61 is disposed between the rear cover 14 and the drum 30.

[0068] The air circulation motor 62 is placed over the base 16 and placed under the drum 30. The air circulation motor 62 rotates the impeller 61. The impeller 61 is a kind of centrifugal ventilation fan for discharging air in a cylindrical direction.

[0069] In some embodiments, the circulation flow path may be configured in various ways.

[0070] In the present embodiment, the circulation flow path includes a rear duct 63 configured to guide a circulation air, discharged by the impeller 61, to the drum 30, a heat pump duct 64 configured to guide, a circulation air supplied by the heat pump unit 50, to the impeller 61, and a drum duct 65 configured to guide, a circulation air discharged by the drum 30, to the heat pump unit 50.

[0071] The rear duct 63 for guiding air discharged by the impeller 61 to the drum 30 is formed in the rear cover 14. The air guided to the drum 30 through the rear duct 63 flows into the drum 30 through the back of the drum 30.

[0072] To this end, a drum inlet 32 is formed at the back of the drum 30 so that air can flow into the drum 30.

[0073] The drum inlet 32 is disposed in the periphery of the driving shaft 41. Accordingly, when the drum 30 is rotated, circulation air discharged by the impeller 61 can flow into the drum through the drum inlet 32.

[0074] The heat pump duct 64 is disposed between the impeller 61 and the heat pump unit 50. The drum duct 65 is disposed between the drum 30 and the heat pump unit 50.

[0075] The heat pump unit 50 may drive a refrigerant in a heat pump cycle. The heat pump unit 50 may heat a circulation air using heat generated from a condenser and may condense moisture within the circulation air using heat generated from an evaporator.

[0076] The heat pump unit 50 according to the present embodiment may implement heating and condensation with respect to a circulation air.

[0077] In an alternative embodiment, only a condenser for condensing moisture within a circulation air may be installed. The condenser operates as an evaporator and has the same function as a second heat exchanger 54 of the present embodiment. In this case, an external air and the circulation air are thermally exchanged in the condenser. The condensate of the circulation air is generated by the condenser through the thermal exchange. A mechanism and structure for generating the condensate through the condenser is known to those skilled in the art, and thus a detailed description thereof is omitted.

[0078] The heat pump unit 50 includes a compressor 51 configured to compress a refrigerant, a first heat exchanger 52 configured to condense the compressed refrigerant by thermally exchanging the compressed refrigerant and a circulation air, an expansion valve (not shown) configured to expand the refrigerant condensed by the first heat exchanger 52, and the second heat exchanger 54 configured to evaporate the refrigerant expanded by the expansion valve by thermally exchanging the expanded refrigerant and the circulation air.

[0079] The first heat exchanger 52 and the second heat exchanger 54 are heat exchangers.

[0080] The expansion valve may be an electronic expansion valve.

[0081] The first heat exchanger 52 is thermally exchanged with a circulation air, and condenses a refrigerant. In the condensing process of the refrigerant, condensation heat of the refrigerant is discharged, and the discharged heat heats the circulation air.

[0082] The circulation air is heated by the condensation heat and used to dry the laundry.

[0083] Although not shown in the present embodiment, a heater (not shown) may be disposed on the circulation flow path, and the circulation air may be heated to a higher temperature using heat generated by the heater.

[0084] The second heat exchanger 54 is thermally exchanged with a circulation air, and evaporates a refrigerant. In the evaporation process of the refrigerant, the refrigerant absorbs evaporation heat, and the circulation air is cooled by the evaporation heat. When the circulation air is cooled, moisture within the circulation air may be condensed, thereby being capable of generating a condensate. The moisture within the circulation air may include wash water evaporated from the laundry.

[0085] In the present embodiment, the first heat exchanger 52 and the second heat exchanger 54 are disposed over the base 16 in a line. A condensate housing 55 in which the first heat exchanger 52 and the second heat exchanger 54 are received is disposed over the base 16. The second heat exchanger 54 and the condenser 54 are disposed in a line within the condensate housing 55.

[0086] The condensate of the circulation air is stored in the condensate housing 55 disposed within the cabinet 10 and is then moved to the condensate discharge container 82 by a condensate pump 84.

[0087] That is, the dryer according to the present embodiment generates a condensate within the cabinet 10, moves the condensate to the condensate discharge container 82 outside the cabinet 10, and stores the condensate in the condensate discharge container 82.

[0088] A circulation air discharged by the drum 30 is supplied to the condensate housing 55 via the drum duct 65. The circulation air is thermally exchanged with the second heat exchanger 54 within the condensate housing 55 and then thermally exchanged with the first heat exchanger 52.

[0089] The second heat exchanger 54 is thermally exchanged with a circulation air discharged by the drum 30, and condensates moisture included in the circulation air. The condensate downward flows by its own weight and collects at the condensate housing 55.

[0090] The condensate housing 55 has its bottom backward inclined. Accordingly, the condensate that has collected at the condensate housing 55 is stored while backward flowing.

[0091] The condensate pump 84 is disposed at the rear of the condensate housing 55. The condensate pump 84 pumps the collected condensate toward the condensate discharge container 82.

[0092] In the present embodiment, the circulation air flows from the front of the condensate housing 55 to the back because the drum duct 65 is disposed at the front of the condensate housing 55. The condensate may nat-

urally flow toward the back of the condensate housing 55 by the inclined direction and the circulation air.

[0093] The circulation air that is thermally exchanged with the second heat exchanger 54 and cooled is thermally exchanged with the first heat exchanger 52 disposed at the back of the second heat exchanger 54. The first heat exchanger 52 heats the circulation air. The circulation air heated by the first heat exchanger 52 flows into the impeller 61 through the heat pump duct 64.

[0094] The condensate storage module 80 stores the condensate, collected at the condensate housing 55, in the condensate discharge container 82.

[0095] A user may separate the condensate discharge container 82 in which the condensate has been stored from the cabinet 10 and discard the condensate stored in the condensate discharge container 82.

[0096] The condensate storage module 80 includes the condensate discharge container 82 detachably disposed in the cabinet 10, the condensate pump 84 disposed in the cabinet 10 and configured to move a condensate, collected at the condensate housing 55, toward the condensate discharge container 82, and a condensation discharge hose 86 configured to guide the condensate, discharged by the condensate pump 84, to the condensate discharge container 82.

[0097] The condensate discharge container 82 is a space in which a condensate generated from the second heat exchanger 54 is stored. The condensate discharge container 82 may be separately disposed outside the cabinet 10.

[0098] A condensate is also stored in the condensate housing 55, but the condensate discharge container 82 is an element different from the condensate housing 55. The condensate housing 55 is used to collect a condensate until a specific amount or more of the condensate is reached. The condensate discharge container 82 is a space for storing a condensate pumped by the condensate housing 55.

[0099] Operation frequency of the condensate pump 84 can be reduced only when a specific amount or more of a condensate is pumped.

[0100] The condensate discharge container 82 is placed on the lower front side of the cabinet 10 and covered with the drawer 70.

[0101] In the present embodiment, the drawer 70 forms a face consecutive to the front cover 11. The drawer 70 covers the entire condensate discharge container 82. In some embodiments, the drawer 70 may cover only part of the condensate discharge container 82 or may not cover the condensate discharge container 82.

[0102] The drawer 70 is disposed in the drawer space 19. The drawer 70 covers the drawer space 19. In the present embodiment, the condensate discharge container 82 may be held in the drawer 70 and pulled out forward from the cabinet 10 along with the drawer 70.

[0103] The drawer 70 includes a drawer cover 71 configured to cover at least part of the condensate discharge container 82, a bucket 87 disposed on the back surface of the drawer cover 71 and configured to have the condensate discharge container 82 held therein, and a drawer holder 72 disposed in the drawer cover 71 and connected to the cabinet 10.

[0104] In some embodiments, the drawer holder 72 may be omitted. If the drawer holder 72 is omitted, the cabinet 10 and the drawer cover 71 are connected. The drawer holder 72 may be integrated with the drawer cover 71.

[0105] The condensate discharge container 82 is supplied with a condensate through the condensation discharge hose 86, and stores the supplied condensate.

[0106] The condensate discharge container 82 is detachably disposed in the cabinet 10. The condensate discharge container 82 is disposed in the drawer space 19 and is pulled out forward from the drawer space 19 along with the drawer 70.

[0107] The condensate discharge container 82 is lengthily extended in the width direction of the cabinet 10. The condensate discharge container 82 may have a length longer in the width direction than in the front and back direction. The condensate discharge container 82 may have a length longer in the up and down direction than in the front and back direction.

[0108] The condensate discharge container 82 formed in the width direction minimizes a depth inserted into the cabinet 10. The length in which the condensate discharge container 82 is pulled out can be minimized because the depth inserted into the cabinet 10 is minimized. That is, a space required to pull out the condensate discharge container 82 is minimized because the length in the front and back direction of the condensate discharge container 82 is minimized.

[0109] When the condensate discharge container 82 is pulled out, a drawer space corresponding to at least a length in the front and back direction of the condensate discharge container 82 is required. In the present embodiment, such a drawer space can be minimized.

[0110] For example, there is no problem in pulling out the condensate discharge container 82 if there is a space to the extent that the door 15 can be open. Although the radius of the door 15 is small, the condensate discharge container 82 can be pulled out.

[0111] The condensate discharge container 82 is disposed at the front of the condensate housing 55. The condensate discharge container 82 is disposed between the drawer 70 and the condensate housing 55. The condensate discharge container 82 is disposed on the lower front side of the drum 30.

[0112] The drum duct 65 is disposed on the lower front side of the drum 30. The drum duct 65 is disposed between the condensate housing 55 and the condensate discharge container 82.

[0113] The condensate discharge container 82 is disposed under the door 15. The condensate discharge container 82 is disposed over the base 16.

[0114] The condensate discharge container 82 has a length longer in the left and right width than in the front

and back direction. There is an advantage in that the length in which the condensate discharge container 82 is pulled out can be minimized because the length of the condensate discharge container 82 is shorter in the front and back direction than in the left and right width as described above.

[0115] A condensate hole 81 is on top of the condensate discharge container 82. The condensate of the condensate housing 55 is supplied through the condensate hole 81.

[0116] The condensate discharge container 82 and the condensation discharge hose 86 may be directly coupled. In the present embodiment, a condensate dropping from the condensation discharge hose 86 flows into the condensate discharge container 82 through the condensate hole 81.

[0117] The attachment/detachment structure of the condensate discharge container 82 can be implemented simply due to the structure in which a condensate drops.

[0118] Furthermore, a front and back direction length w1 on the top surface of the condensate discharge container 82 is smaller than a front and back direction length w2 on the bottom thereof. Accordingly, the condensate discharge container 82 has a cross section that becomes wider from the top to the bottom.

[0119] There is an advantage in that a user can lift up the condensate discharge container 82 more easily because the top of the condensate discharge container 82 is narrower. That is, a user can grasp the condensate discharge container 82 easily because the condensate discharge container 82 is short in the front and back direction and long in the width direction.

[0120] In the present embodiment, an incline plane 88 is formed on the back surface of the condensate discharge container 82 due to such a difference between the front and back direction lengths w1 and w2. The condensate discharge container 82 may have a trapezoid shape. In the present embodiment, however, the condensate discharge container 82 may have a generally vertical front surface and an inclined back surface.

[0121] Such a shape has been made by taking into consideration an angle when a user lifts up the condensate discharge container 82. A user tends to lift up the condensate discharge container 82 while pulling it toward his or her side rather than to vertically lift up the condensate discharge container 82. The incline plane 88 on the back surface of the condensate discharge container 82 has been made by taking into consideration such a use pattern.

[0122] There is an advantage in that the incline plane 88 can minimize interference with other elements of the cabinet 10 when a user lifts up the condensate discharge container 82.

[0123] Furthermore, the bottom of the condensate discharge container 82 is wider than the top thereof. Accordingly, the condensate discharge container 82 does not fall although a condensate rolls, and thus the condensate can be safely held in the condensate discharge container 82.

[0124] The front surface of the condensate housing 55 is inclined in accordance with the incline plane 88 of the condensate discharge container 82. Accordingly, the upper front side of the condensate housing 55 is forward protruded, and the lower front side thereof is backward recessed.

[0125] The shaking of the condensate discharge container 82 can be minimized because the front surface of the condensate housing 55 and the back surface of the condensate discharge container 82 are matched in shape and closely attached, and thus vibration can be suppressed when the drum 30 operates.

[0126] Furthermore, the center of gravity of the dryer can move downward because the condensate discharge container 82 is disposed under the drum 30. That is, the center of gravity of the dryer further moves downward as a condensate is stored in the condensate discharge container 82. Accordingly, stability can be improved when the drum 30 operates as the center of gravity of the dryer moves downward.

[0127] Furthermore, since the condensate discharge container 82 is disposed at the front of the drum 30, a variation in weight can be reduced in accordance with the driving unit 40. That is, weight of the dryer can be distributed in the front and back direction because the driving unit 40 is disposed on the back side of the drum 30 and the condensate discharge container 82 is disposed on the front side of the drum 30 based on the front and back direction of the dryer.

[0128] As described above, the location of the condensate discharge container 82 has an advantage in that vibration generated when the dryer operates can be reduced.

[0129] The condensate pump 84 is disposed at the back of the condensate housing 55.

[0130] The condensation discharge hose 86 has one end coupled to the condensate pump 84 and has the other end coupled to the condensate hole 81.

[0131] The condensate pump 84 may be disposed inside the rear cover 14. In the present embodiment, a pump cover 85 is separately provided. The pump cover 85 is assembled with the rear cover 14, thus hiding the pump 84. When the pump 84 fails or is checked, the pump cover 85 may be separated so that the condensate pump 84 is exposed.

[0132] The drawer 70 includes the bucket 87 configured to receive a condensate overflowed from the condensate discharge container 82. The bucket 87 is disposed on the back surface of the drawer 70. The bucket 87 is integrated with the drawer 70. In some embodiments, the bucket 87 may be fabricated separately from the drawer 70 and then fixed to the drawer 70.

[0133] The condensate discharge container 82 may be separated upward from the bucket 87. The condensate discharge container 82 is held inside the bucket 87.

[0134] The bucket 87 may receive at least part of the condensate discharge container 82. In the present em-

bodiment, the bucket 87 is disposed under the condensate discharge container 82, and part of the lower side of the condensate discharge container 82 is inserted into the bucket 87.

[0135] The bucket 87 stores a condensate overflowed from the condensate hole 81. The bucket 87 further includes a support rib 89 configured to support the condensate discharge container 82.

[0136] The support rib 89 is formed on the top surface of the bucket 87 on the inside thereof. The condensate discharge container 82 is held in the support rib 89. The condensate discharge container 82 is spaced apart by the height of the support rib 89. Accordingly, a condensate overflowed from the periphery of the support rib 89 can be received.

[0137] The overflowed condensate may flow into the condensate housing 55. To this end, an overflow path 100 for coupling the bucket 87 and the condensate housing 55 is installed.

[0138] A check valve 102 is installed on the overflow path 100. The check valve 102 allows a condensate to flow only from the bucket 87 to the condensate housing 55, but prevents a condensate from flowing in the opposite direction. Specifically, the check valve 102 may prevent the wet steam of the condensate housing 55 from moving to the bucket 87.

[0139] The overflow path 100 may be fabricated as a single part. In the present embodiment, the overflow path 100 includes a first overflow joint pipe 101 coupled to the condensate housing 55 and a second overflow joint pipe 103 coupled to the bucket 87.

[0140] The check valve 102 is installed on the first overflow joint pipe 101. In some embodiments, the check valve 102 may be installed on the second overflow joint pipe 103.

[0141] The first overflow joint pipe 101 and the second overflow joint pipe 103 may be coupled or separated.

[0142] When the drawer 70 is received in the drawer space 19, the first overflow joint pipe 101 and the second overflow joint pipe 103 are coupled. When the drawer 70 is pulled out from the drawer space 19, the first overflow joint pipe 101 and the second overflow joint pipe 103 are separated. Although the second overflow joint pipe 103 is separated from the first overflow joint pipe 101, a fluid within the condensate housing 55 is prevented from flowing outward by the check valve 102.

[0143] If the overflow path 100 is formed of a single part, it may be disposed on at least one side of the bucket and the condensate housing. If the overflow path 100 is formed of a single part, when the drawer 70 is pulled out from the drawer space 19, the connection of the bucket 82 and the condensate housing 55 by the overflow path 100 is released. If the overflow path 100 is formed of a single part, when the drawer 70 is received in the drawer space 19, the bucket 82 and the condensate housing 55 are coupled by the overflow path 100.

[0144] The drawer 70 is disposed at the front of the condensate discharge container 82.

[0145] In the present embodiment, the entire condensate discharge container 82 has been illustrated as being covered with the drawer 70. In an alternative embodiment, only part of the condensate discharge container 82 may be covered with the drawer 70.

[0146] The drawer 70 may be pulled out forward by a user's manipulation force. When the drawer 70 is pulled out, the condensate discharge container 82 is also pulled out forward. The condensate discharge container 82 is moved forward and exposed to a user.

[0147] The drawer 70 forms the front surface of the dryer along with the front cover 11.

[0148] The drawer 70 is disposed on the lower side of the front cover 11.

[0149] In the present embodiment, in order to pull out the drawer 70 forward, the guide supporter 90 is installed. The guide supporter 90 has one side fixed to a cabinet-side structure and has the other side fixed to a drawer assembly-side structure.

[0150] Two guide supporters 90 may be disposed on the left and right sides in its width direction. In some embodiments, only one guide supporter 90 may be installed.

[0151] In the present embodiment, the guide supporter 90 is disposed under the drawer assembly and can be prevented from being exposed to a use.

[0152] The guide supporter 90 may be configured in multiple stages in such a way as to be extended in the front and back direction. In the present embodiment, the guide supporter 90 has been illustrated as being configured in three stages. In an alternative embodiment, the guide supporter 90 may be configured in two stages.

[0153] In the present embodiment, the guide supporter 90 includes a first guide supporter 92, a second guide supporter 94, and a third guide supporter 96 which are moved in the front and back direction.

[0154] The first guide supporter 92 is fixed to the cabinet side. The third guide supporter 96 is fixed to the drawer 70. The second guide supporter 94 couples the first and the third guide supporters 92 and 96.

[0155] The first guide supporter 92 may be fixed to the base 16 or the condensate housing 55. In the present embodiment, the first guide supporter 92 has been illustrated as being fixed to the condensate housing 55.

[0156] The third guide supporter 96 may be fixed to the drawer 70 or the bucket 87. Specifically, the third guide supporter 96 may be fixed to the drawer holder 72 of the drawer 70.

[0157] In the present embodiment, the guide supporter 90 may be coupled to the drawer assembly and may support a load of the drawer assembly.

[0158] In the present embodiment, the third guide supporter 96 is fixed to the lower side of the bucket 87 and is placed between the drawer holder 72 and the bucket 87.

[0159] The second guide supporter 94 is disposed over the first guide supporter 92 and moved relative to the first guide supporter 92. The third guide supporter 96 is disposed over the second guide supporter 94.

[0160] The first guide supporter 92 and the second guide supporter 94 may be moved relative to each other. The second guide supporter 94 and the third guide supporter 96 may be moved relative to each other.

[0161] A load of the second guide supporter 94, the third guide supporter 96, the bucket 87, and the drawer 70 is concentrated on the first guide supporter 92. Accordingly, the first guide supporter 92 may have the largest width.

[0162] When the second and the third guide supporters 94 and 96 are closely attached to the back side, a latch 95 configured to maintain the state in which the first, the second, and the third guide supporters 92, 94, and 96 have been closely attached to the back side may be further installed. In the present embodiment, the latch 95 is disposed in the first guide supporter 92.

[0163] A latching member (e.g., a hook) for engagement with the latch 95 may be disposed in the third guide supporter 96. In some embodiments, the latching member may be disposed in the drawer 70.

[0164] In some embodiments, at least one of the latch 95 and the latching member may be disposed in the drawer-side structure, and the other thereof may be disposed in the cabinet-side structure.

[0165] Unlike in the present embodiment, at least one of the latch 95 and the latching member may be disposed in the first guide supporter 92, and the other thereof may be disposed in the third guide supporter 96.

[0166] When a user presses the drawer 70 backward, the latching of the latch 95 may be released. When the latching of the latch 95 is released, a drawer elastic member (not shown) configured to push the drawer 70 forward may be further disposed.

[0167] The drawer elastic member is disposed between the cabinet-side structure and the drawer assembly-side structure, and may provide an elastic force.

[0168] For example, the drawer elastic member may be installed on at least one of the first, the second, and the third guide supporters 92, 94, and 96.

[0169] For example, the drawer elastic member may be installed on at least one of the condensate housing 55, that is, the cabinet-side structure, and the guide supporter 90, that is, the drawer-side structure, and may provide a forward elastic force.

[0170] For example, the drawer elastic member may be installed on the latch 95, and may provide an elastic force to the third guide supporter 96.

[0171] In order to pull out the drawer 70, a user releases the latching of the latch 95 by pushing the drawer 70 backward, and thus the drawer 70 is forward pushed and moved by the elastic force of the drawer elastic member.

[0172] In order to receive the drawer 70 in the cabinet 10, a user closely attaches the drawer 70 to the back side and is engaged with the latch 95.

[0173] The latching of the latch 95 or the release of the latching is known to those skilled in the art, and thus a detailed description thereof is omitted.

[0174] Furthermore, when the third guide supporter 96 is latched by the latch 95, the first overflow pipe 101 and the second overflow pipe 103 are coupled. The coupling of the first overflow pipe 101 and the second overflow pipe 103 is maintained by the latch 95.

[0175] When the latching of the latch 95 is released, the first overflow pipe 101 and the second overflow pipe 103 are separated.

[0176] The guide supporter 90 and the latch 95 function to reliably form the overflow path 100, and prevent the condensate of the bucket 87 from leaking.

[0177] A sensor 83 configured to sense the home position of the condensate discharge container 82 may be further installed on the condensate discharge container 82. The sensor 83 detects whether the condensate discharge container 82 has been placed at an accurate location.

[0178] If the condensate discharge container 82 deviates from the home position, there is a problem in that a condensate supplied by the condensate pump 84 drops at a wrong location.

[0179] The sensor 83 functions to sense the home position of the condensate discharge container 82 and to also prevent the leakage of a condensate. Accordingly, the sensor 83 may sense both the condensate discharge container 82 and the home position of the drawer 70. Specifically, the sensor 83 may also sense the connection state of the overflow path 100.

[0180] To this end, the sensor 83 may be installed on at least one of a structure that is moved when the drawer 70 is pulled out and a fixed structure. The sensor 83 may be installed on at least one of the cabinet side or the drawer assembly.

[0181] For example, the sensor 83 may be installed on at least one of the bucket side and the condensate housing side.

[0182] Unlike in the present embodiment, the sensor 83 may be installed on at least one of the bucket side and the base side. In an embodiment, the sensor 83 may be installed on at least one of the condensate discharge container side and the condensate housing side. In another embodiment, the sensor 83 may be installed on at least one of the drawer side and the base side. In yet another embodiment, the sensor 83 may be installed on at least one of the drawer side and the condensate housing side. In still yet another embodiment, the sensor 83 may be installed on at least one of the third guide supporter side and the first guide supporter side. Unlike in the present embodiment, the sensor 83 may be installed on at least one of the first overflow joint pipe side and the second overflow joint pipe side.

[0183] In the present embodiment, the sensor 83 is a magnetic sensor. In the case of the magnetic sensor, a permanent magnet is disposed on the drawer assembly side, and a magnetic sensing unit for detecting a magnetic field is installed on at least one of the condensate housing 55 and the base 16. Accordingly, the magnetic sensor may detect whether the drawer assembly has been received.

[0184] In the present embodiment, a magnetic sensing unit 83a is installed on the condensate housing 55, and a permanent magnet 83b is installed on the bucket 87.

[0185] When the drawer 70 is closely attached to the condensate housing 55, the magnetic sensing unit 83a senses the permanent magnet 83b. The control unit (not shown) of the dryer determines the home position of the condensate discharge container 82 or the connection state of the overflow path 100 by determining the magnetic force of the permanent magnet 83b through the magnetic sensing unit 83a.

[0186] The control unit drives the condensate pump 84 only when the magnetic sensing unit 83a senses a magnetic force of a specific amount or more. Accordingly, the condensate of the condensate housing 55 is supplied to the condensate discharge container 82 through the condensation discharge hose 86. The condensate discharge container 82 placed at the home position drops to the condensate hole 81.

[0187] Unlike in the present embodiment, the sensor 83 may be an optical sensor. The optical sensor may be installed on at least one of the condensate housing 55 and the base 16, and may detect whether the drawer assembly has been received.

[0188] The dryer according to an embodiment of the present invention has the following one or more effects.

[0189] First, there is an advantage in that a space required to pull out the condensate discharge container can be minimized because the condensate discharge container is laterally disposed.

[0190] Second, there is an advantage in that a drum having a higher capacity compared to the same size can be installed because a structure disposed over the drum within the cabinet is minimized and the condensate discharge container is disposed on the lower side of the drum, which has a relatively great margin.

[0191] Third, there is an advantage in that the center of gravity is further lowered by a condensate generated in a dryer operation process because the condensate discharge container is disposed under the drum.

[0192] Fourth, there is an advantage in that only the condensate discharge container can be separated by lifting up the condensate discharge container exposed to a user after the drawer is pulled out.

[0193] Fifth, there is an advantage in that load imbalance in the front and back direction of the dryer can be minimized when a condensate is filled because the condensate discharge container is disposed at the front of the drum.

[0194] Sixth, there is an advantage in that the condensate discharge container can be moved to the location where a user can graph it easily because the condensate discharge container is also pulled out when the drawer is pulled out.

[0195] Those skilled in the art to which the present invention pertains will appreciate that the present invention may be implemented in other detailed forms without departing from the essential characteristics of the present invention. Accordingly, the aforementioned embodiments should be understood as being only illustrative, but should not be understood as being restrictive from all aspects. The scope of the present invention is defined by the following claims rather than the detailed description, and the meanings and scope of the claims and all changes or modified forms derived from their equivalents should be construed as falling within the scope of the present invention.

Claims

1. A dryer, comprising:

   a cabinet (10) configured to have an entry hole formed on a front surface of the cabinet (10), a door (15) being installed in the entry hole;
   a drum (30) disposed within the cabinet (10) and configured to rotate with a laundry received within the drum (30);
   an evaporator (54) disposed within the cabinet (10) and configured to remove moisture from air circulating through the drum (30) by condensing the moisture;
   a condensate housing (55) disposed within the cabinet (10), a condensate condensed by the evaporator (54) being collected at the condensate housing (55);
   a drawer space (19) disposed under the entry hole and recessed backward from the front surface of the cabinet (10);
   a drawer (70) disposed in the drawer space (19) and configured to move with respect to the cabinet (10) in such a way as to be pulled out from the drawer space (19); and
   a condensate discharge container (82) configured to have the condensate of the condensate housing (55) moved and stored in the condensate discharge container (82), detachably held in the drawer (70), and exposed to a user when the drawer (70) is pulled out.

2. The dryer of claim 1, wherein the condensate discharge container (82) is configured to be pulled out forward from the cabinet (10).

3. The dryer of claim 1, or 2, wherein the drawer (70) is installed to linearly move back and forth with respect to the cabinet (10).

4. The dryer of claim 1, 2, or 3, wherein the drawer space (19) is placed under the entry hole.

5. The dryer of claim 1, 2, or 3, wherein the drawer space (19) is placed inside the front surface of the cabinet (10).

6. The dryer of any one of claims 1 to 5, wherein the drawer (70) is placed under at least one of the drum (30) and the door (15).

7. The dryer of any one of claims 1 to 6, wherein the condensate discharge container (82) is disposed in a width direction of the cabinet (10).

8. The dryer of any one of claims 1 to 7, wherein the condensate discharge container (82) has a length longer in a left and right width direction than in a front and back direction.

9. The dryer of any one of claims 1 to 8, wherein a front and back direction length w1 on a top surface of the condensate discharge container (82) is smaller than a front and back direction length w2 on a bottom surface of the condensate discharge container (82).

10. The dryer of any one of claims 1 to 9, wherein the condensate housing (55) is disposed at a back of the condensate discharge container (82).

11. The dryer of claim 10, wherein:

an inclined plane (88) is formed on a back surface of the condensate discharge container (82), and
a front surface of the condensate housing (55) is inclined in accordance with the inclined plane (88) of the condensate discharge container (82).

12. The dryer of any one of claims 1 to 11, wherein the drawer (70) is configured to cover at least part of the condensate discharge container (82).

13. The dryer of any one of claims 1 to 12, wherein the drawer (70) comprises a bucket (87) for storing a condensate overflowed from the condensate discharge container (82).

14. The dryer of claim 13, further comprising an overflow path disposed between the bucket (87) and the condensate housing (55) and configured to recover the condensate overflowed from the condensate discharge container (82) toward the condensate housing (55), wherein:

the overflow path is disposed on at least one of a bucket side and a condensate housing side,
a coupling of the bucket (87) and the condensate housing by the overflow path is released when the drawer (70) is pulled out from the drawer space (19), and
the bucket (87) and the condensate housing are coupled by the overflow path when the drawer (70) is received in the drawer space (19).

15. The dryer of claim 13, or 14, wherein the drawer (70) comprises:

a drawer cover (71) configured to cover at least part of the condensate discharge container (82); and
the bucket (87) disposed on a back surface of the drawer cover (71) and configured to have the condensate discharge container (82) held in the bucket (87).

Fig. 1

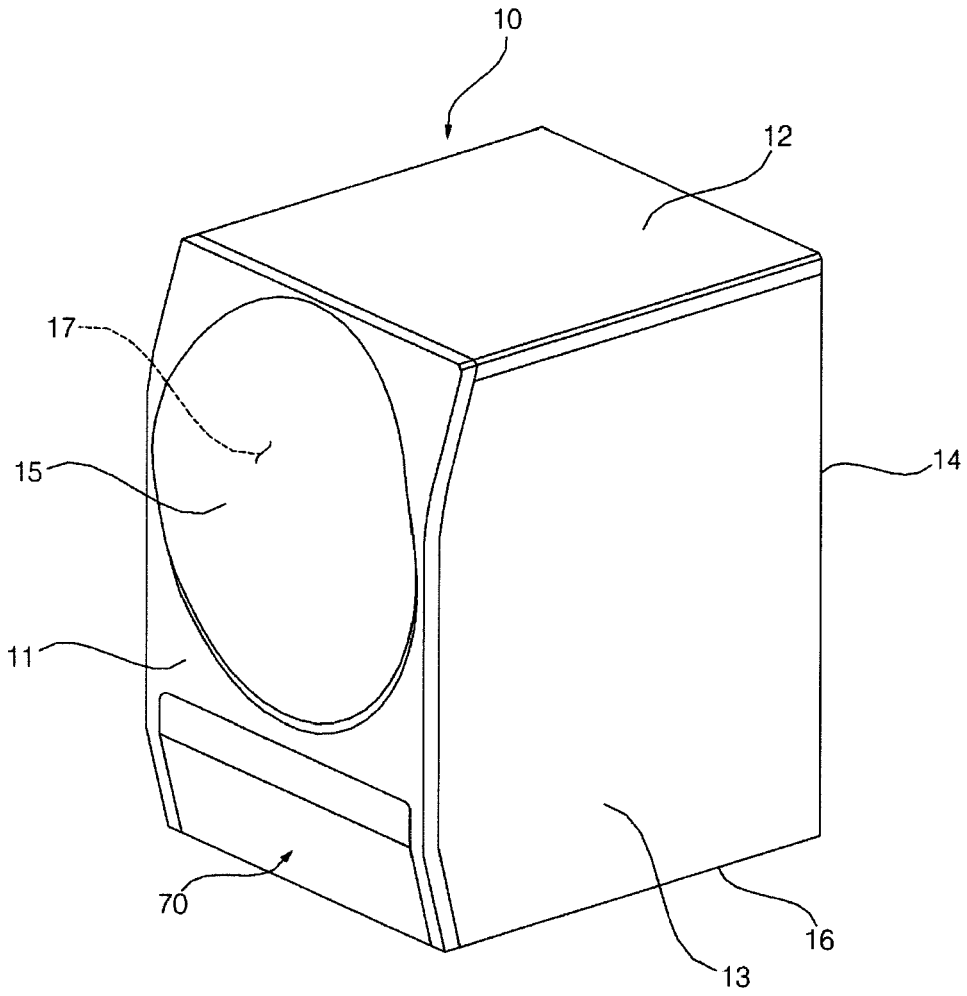


Fig. 2

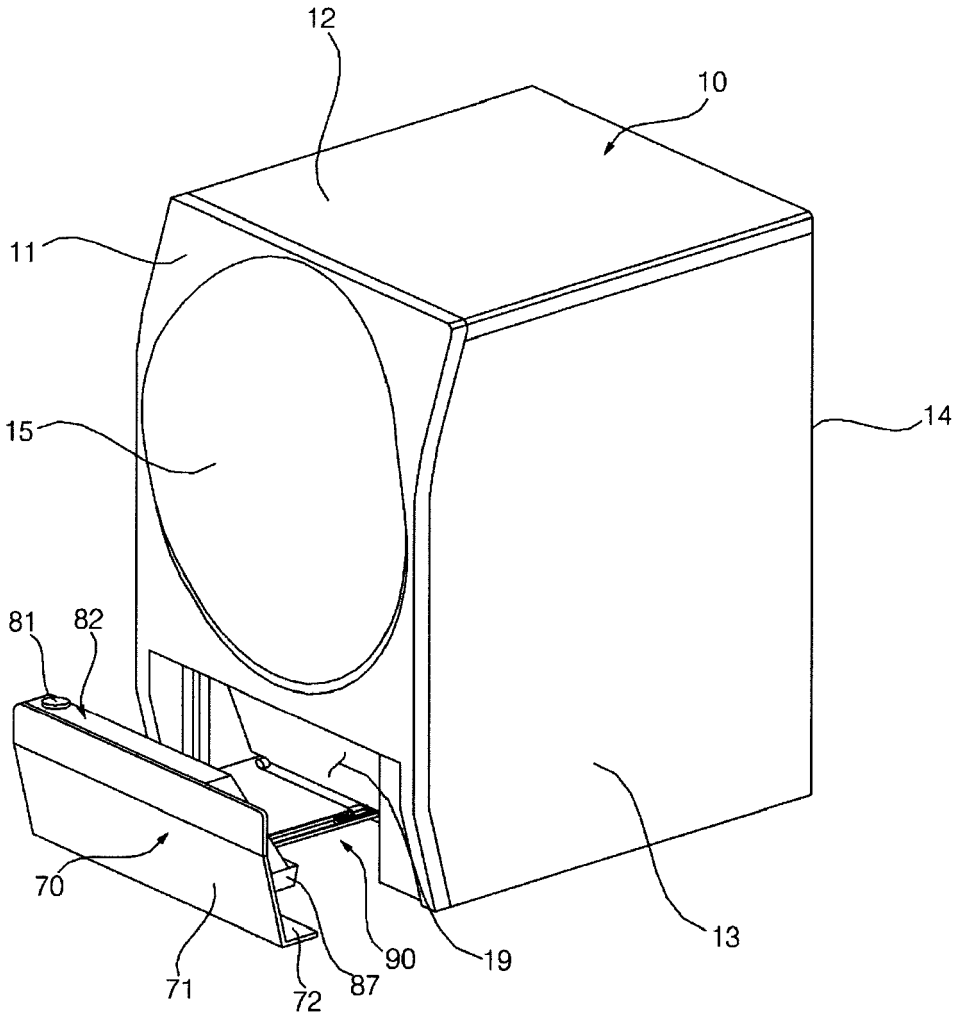


Fig. 3

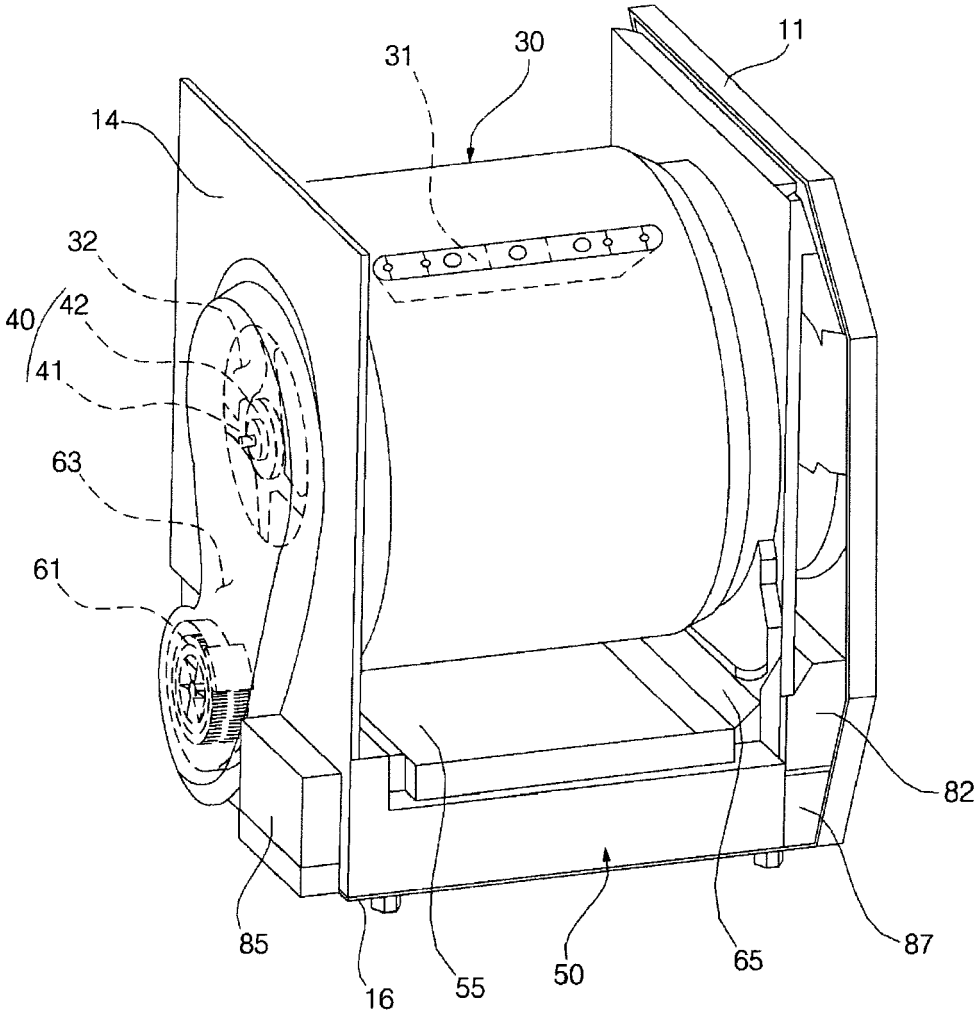


Fig. 4

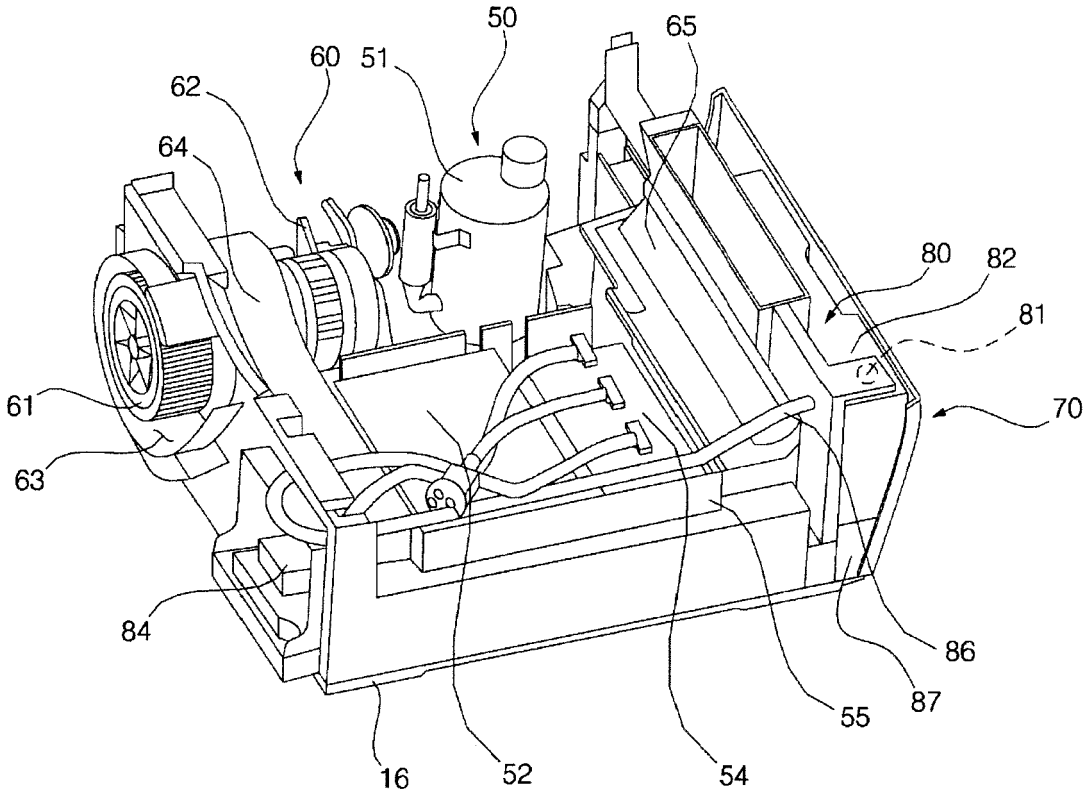


Fig. 5

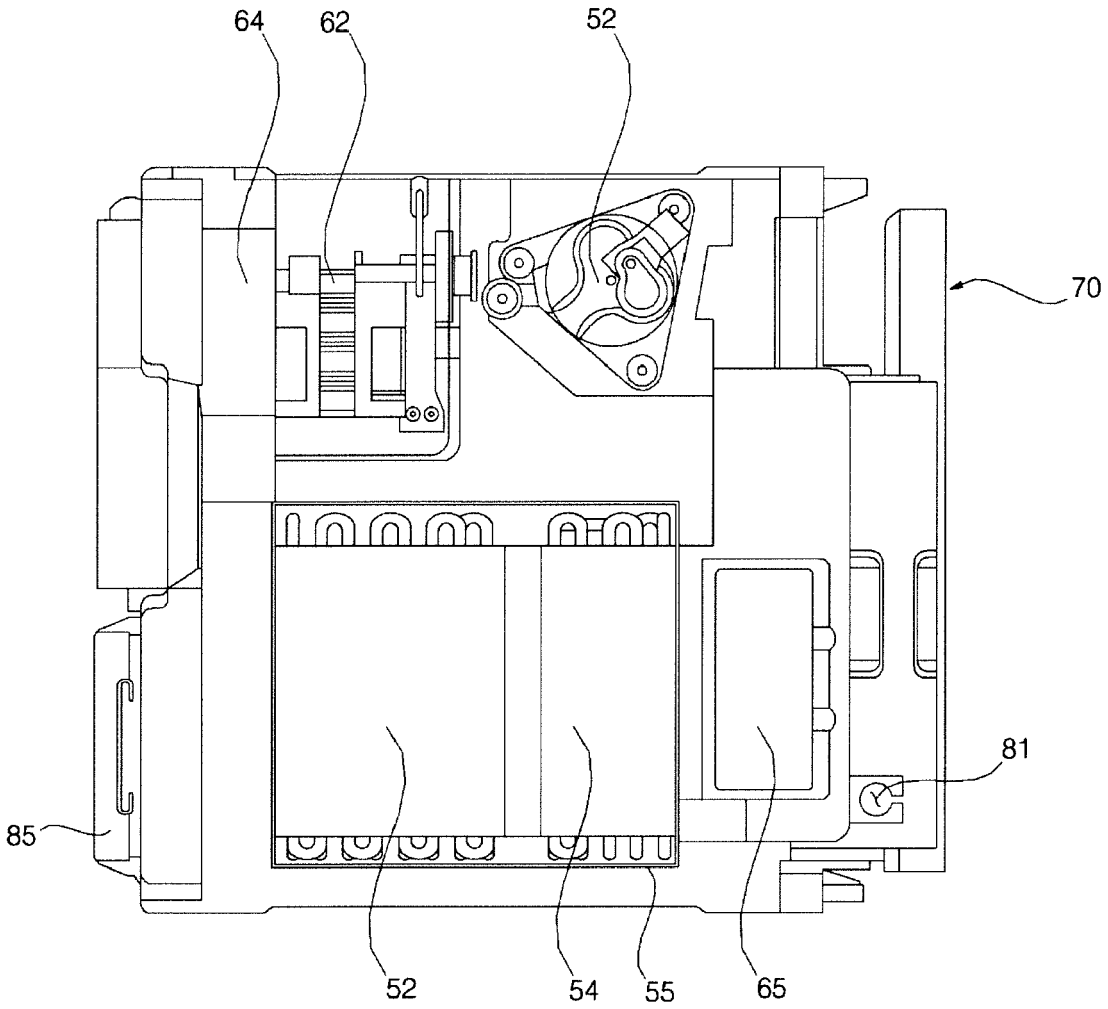


Fig. 6

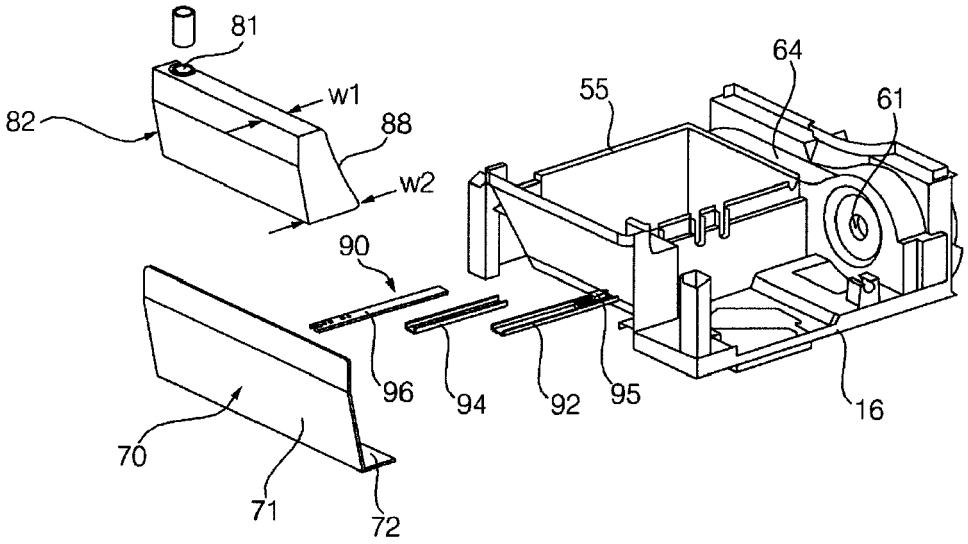


Fig. 7

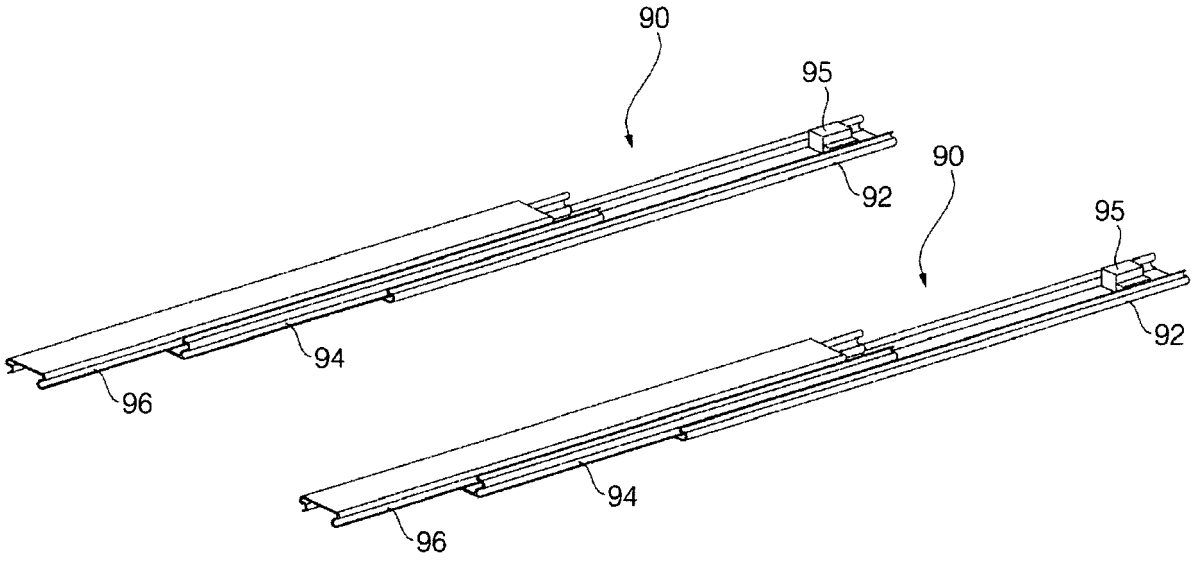


Fig. 8

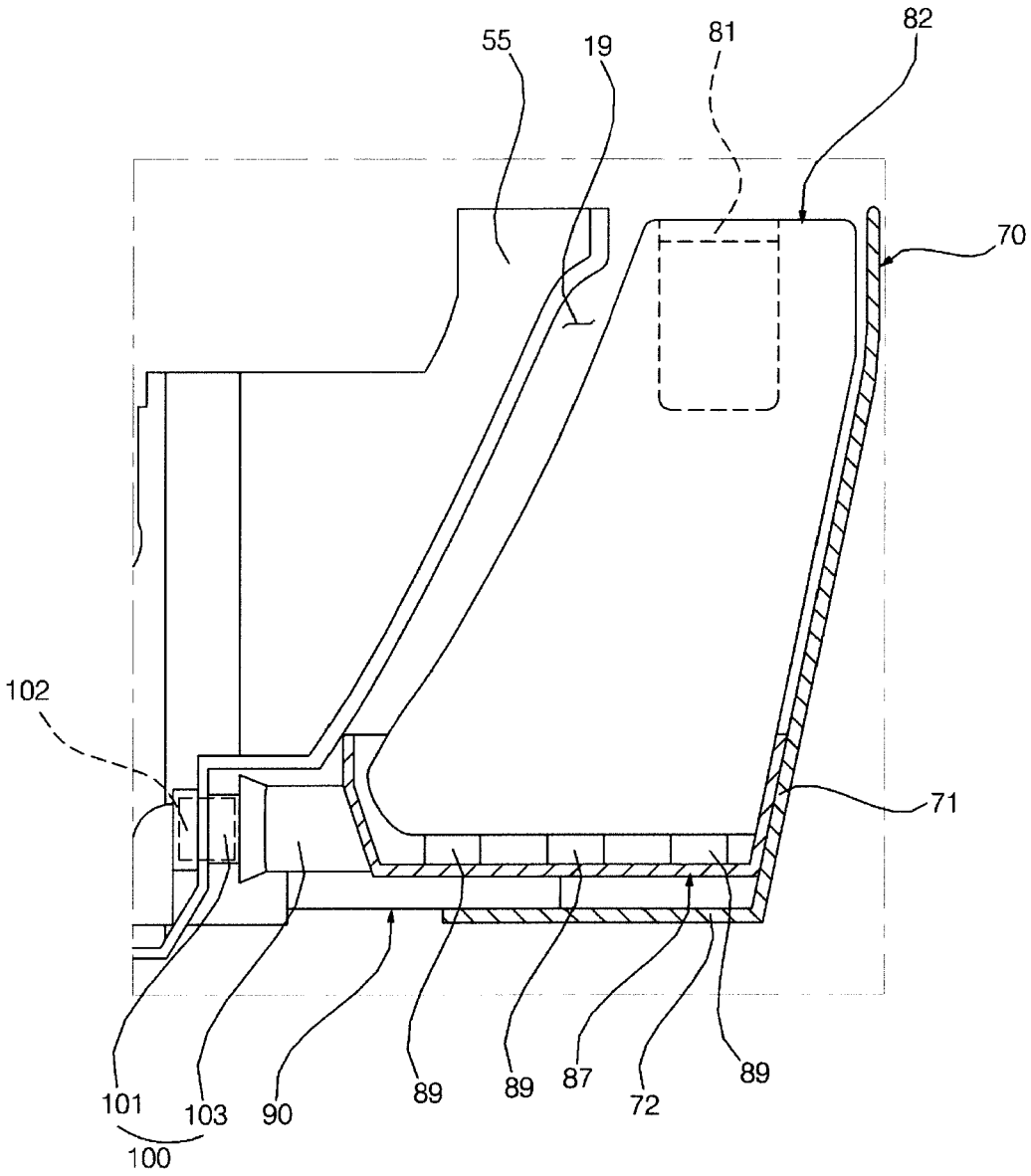


Fig. 9

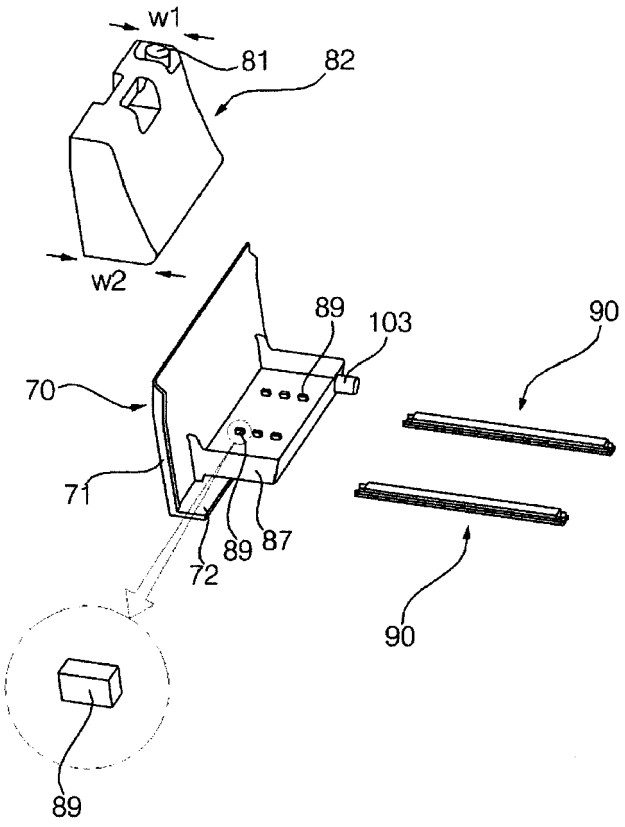


Fig. 10

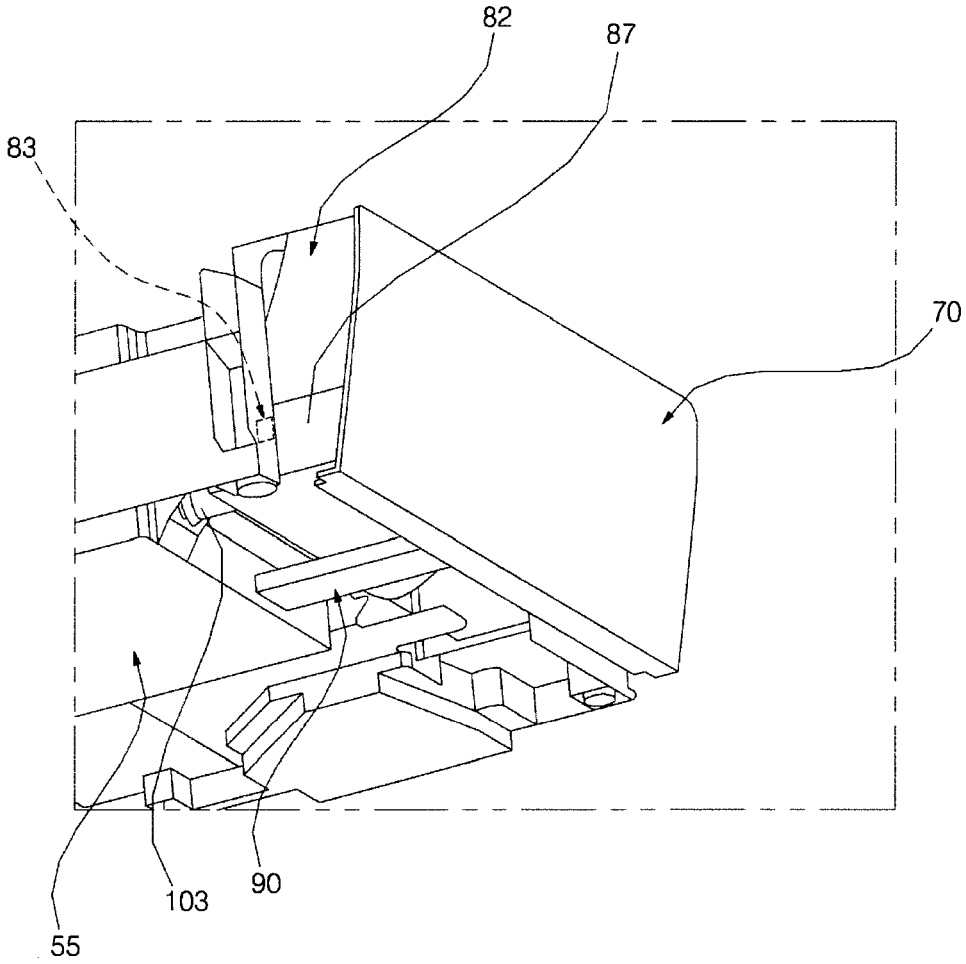
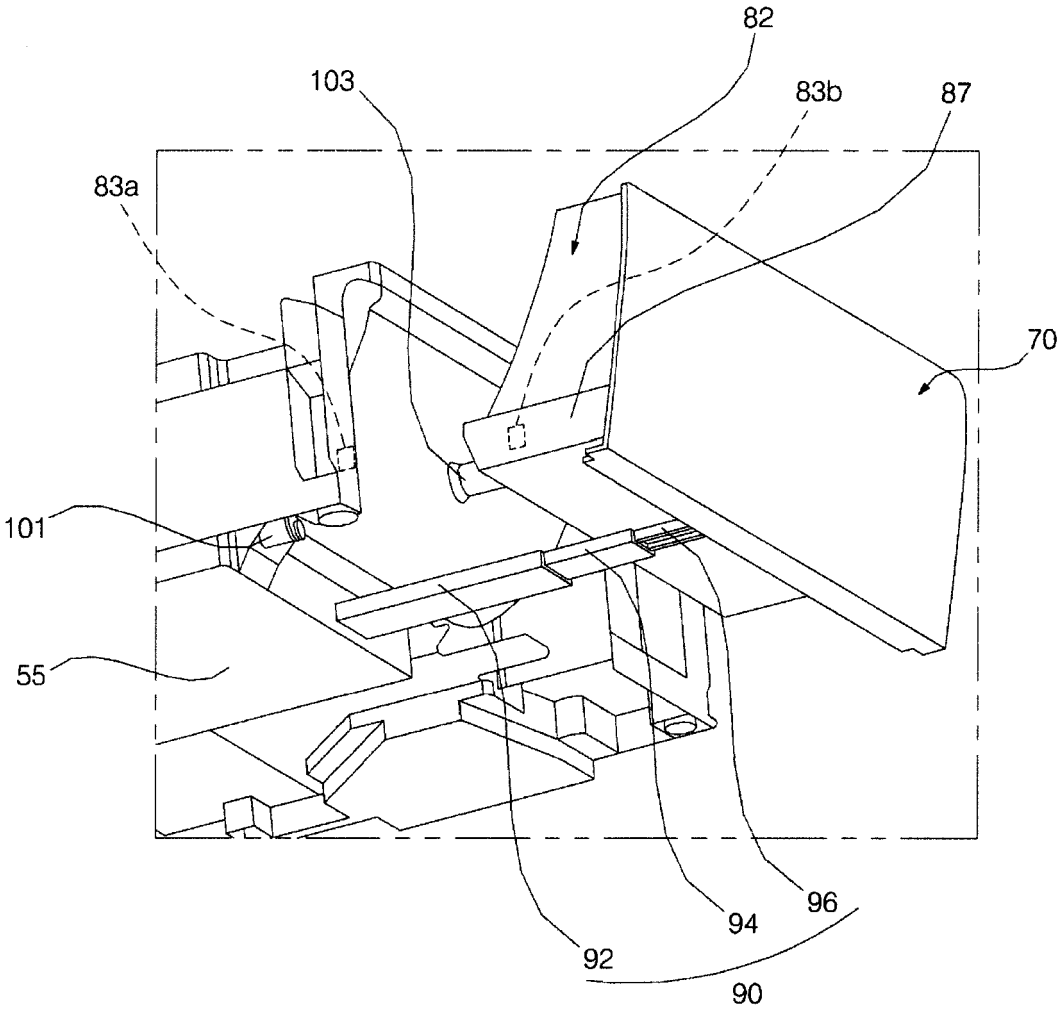


Fig. 11



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EUROPEAN SEARCH REPORT

Application Number
EP 16 17 7490

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Place of search	Date of completion of the search	Examiner
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